IN THE SPECIFICATION

Please replace the paragraph beginning at page 1, lines 5-8, with the following rewritten paragraph:

This application is ~~based on~~ a divisional application of allowed U.S. Application Serial No. 09/525,941 filed on March 15, 2000, which claims the benefit of priority to Japanese Patent Application No. 11-69908 filed March 16, 1999, and ~~No.~~ 2000-51779 filed February 28, 2000, ~~the contents of which are cited herein by reference~~ the entire contents of both which are incorporated herein by reference.

Please amend the specification as follows:

Page 1, please replace paragraph beginning at line 24, through page 2, line 7, as follows:

An example of the structure of the control rod 2 will be described with reference to a schematic perspective view of FIG. 2A. As shown in FIG. 2A, the control rod 2 mainly comprises blades 3, a handle 4 attached to the upper ends of the blades 3 and ~~lower-blades~~ lower-blades 5 attached to the lower ends of the blades 3. More specifically, the blade 3 comprises neutron absorbers 6, a sheath 7 housing them and insertion pieces 8 inserted for the purpose of securing a portion to allow water to flow between the neutron absorbers 6 in the sheath 7.

Page 2, please replace paragraph beginning at line 26, through page 3, line 4, as follows:

The blades 3 are fixed to the tie rod 9, with the result that the control rod 2 is assembled (S5). Thereafter, welding of the tie rod 9 (S6) and welding of the handles 4 and the ~~lower blades~~ lower-blades 5 (S7) are carried out. Finally, the control rod 2 is smoothed by finishing with a wire brush or the like (S8).

Page 2, please replace paragraph beginning at line 26, through page 3, line 4, as follows:

Further, the tie rod 9, the handles 4 and the ~~lower blades~~ lower-blades 5 are combined with the blades 3 produced by the above method, with the result that the control rod 2 is assembled (S18). Thereafter, welding of the handles 4 and the ~~lower blades~~ lower-blades 5 (S20) are carried out. Finally, the control rod 2 is finished with a wire brush (S21).

Page 4, please replace paragraph at lines 3-10 as follows:

In the case where the control rod 2 of the reactor is manufactured as described above, first, the sheath 7 is cut and bent, and thereafter the blade 3 is assembled. Then, the frames of the tie rod 9, the handles 4 and the ~~lower blades~~ lower-blades 5 are assembled. Further, welding of the blades 3, the tie rod 9, the handles 4 and the ~~lower blades~~ lower-blades 5 and welding of the sheath 7 and the insertion pieces 8 are carried out.

Page 5, please replace paragraph at lines 4-17 as follows:

(1) In a method for manufacturing a control rod for a nuclear reactor comprising blades including neutron absorbers, insertion pieces and a sheath, weep holes and piece-inserting holes are formed in the sheath by cut working and the periphery is cut. Thereafter, the neutron absorbers and the insertion pieces are inserted in a recess portion formed by bending the sheath. The piece-inserting holes and the insertion pieces are welded together by a laser beam, thereby forming an integral blade. The blades and handles are welded by a laser beam, and subsequently, the blades and ~~lower blades~~ lower-blades are welded by a laser beam. Then, the welded portions are surface-finished by a wire brush or the like.

Page 5, please replace paragraph beginning at line 18, through page 6, line 1 as follows:

(2) In a method for manufacturing a control rod for a nuclear reactor comprising blades including neutron absorbers and a sheath, weep holes are formed in the sheath by cut

working. After the periphery is cut, the neutron absorbers are inserted in a recess portion formed by bending the sheath, thereby forming an integral blade. The blades and handles are welded by a laser beam, and subsequently, the blades and ~~lower blades~~ lower-blades are welded by a laser beam. Then, the welded portions are surface-finished by a wire brush or the like.

Page 6, please replace paragraph at lines 7-23 as follows:

(3) In the welding time, to reliably melt a ~~bevel~~ groove line and secure the penetration bead on the rear surface of the sheath, a YAG laser beam or a CO2 laser beam is irradiated on a position located immediately above a ~~bevel~~ groove position or a position deviated in parallel from the ~~bevel~~ groove position within a range of 2 mm. The laser beam may be irradiated several times so as to lap over one another, shifted within a range of 0.1 to 2.0 mm from a first pass or a first pass target position. Alternatively, the laser beam is irradiated while traveling forward with circular motion in a diameter within 2 mm. To produce circular motion of the laser beam, a prism is inserted before a condenser lens, and while the prism is rotating on an axis of the laser beam, the laser beam is irradiated on the rotating prism. As a result, the laser beam is incident on the condenser lens, while rotating.

Page 6, please replace paragraph at lines 24-26 as follows:

With the above method, in any case, the ~~bevel~~ groove line is reliably melted and the penetration bead on the rear surface is secured.

Page 6, please replace the paragraph beginning at line 27, through page 7, line 8, as follows:

(4) As another method, in the step for welding the blade to the tie rod, the blade to the handle or the blade to the ~~lower blade~~ lower-blade, two slits are provided in the tie rod, the handle or the ~~lower blade~~ lower-blade, and projections of the blade is inserted in the slits. The laser beam is irradiated on a boundary between the blade and the tie rod, a boundary

between the blade and the handle or a boundary between the blade and the ~~lower blade~~ lower-blade.

Page 7, please replace the paragraph at lines 9-14 as follows:

With the above method, in any case, the ~~bevel~~ groove line is reliably melted and the penetration bead on the rear surface is secured. In addition, the ~~bevel~~ groove line is not deviated due to the work accuracy of the blade. Therefore, the laser beam is reliably irradiated on the ~~bevel~~ groove line.

Page 7, please replace paragraph beginning at line 15, through page 8, line 8, as follows:

(5) A CCD camera is mounted on the work head, and the CCD camera in its entirety is moved to the ~~bevel~~ groove position as designed. An image near the welding portion is picked up by the CCD camera. The image processing apparatus detects the actual ~~bevel~~ groove position from the image, i.e., the coordinates of the center of the insertion piece from the ~~bevel~~ groove position in the case of welding the piece-inserting hole of the sheath and the insertion piece. In the case of welding the blades and the tie rod, welding of the blades and the handles or welding of the blades and the ~~lower blades~~ lower-blades, the work start and end points of the welding are detected from the ~~bevel~~ groove position. The arithmetic processing apparatus compares the actual ~~bevel~~ groove position with the ~~bevel~~ groove position as designed, and calculates the deviation of the irradiation position of the laser beam. After the work head is moved by a distance corresponding to the amount of the deviation of the irradiation position of the laser beam plus the amount of the offset of the work head and the CCD camera, the laser beam is irradiated.

Page 8, please replace the paragraph at lines 9-14 as follows:

With the above apparatus for manufacturing a control rod, even if there is a difference between the ~~bevel~~ groove position as designed and the actual ~~bevel~~ groove position, the ~~bevel~~

groove line is melted reliably, the penetration bead on the rear surface of the sheath is secured, and the welding process can be automated.

Page 8, please replace the paragraph beginning at line 19, through page 9, line 3, as follows:

(6) In an apparatus for manufacturing a control rod of a nuclear reactor, the control rod comprising blades including neutron absorbers, an insertion pieces and a sheath or blades including neutron absorbers and a sheath, a tie rod for fixing the blade, a handle and a ~~lower blade~~ lower-blade fixed to the tie rod and the blade, there is provided a work table, a laser oscillator, a work head, a CCD camera, an image processing apparatus, an arithmetic processing apparatus. a servo motor and control means. The above apparatus comprises at least two work heads and two work tables and a movable mirror between the laser oscillator and the work heads.

Page 9, please replace the paragraph at lines 4-23 as follows:

The work table is used to set objects to be welded constituting the control rod and carry out welding. The laser oscillator outputs a YAG laser beam or CO2 laser beam. The work head has an optical system for transmitting the laser beam oscillated by the laser oscillator and converging it to the objects to be welded by a condenser lens. The CCD camera, mounted on the work head, picks up an image of a portion near a ~~bevel~~ groove of the objects to be welded. The image processing apparatus detects a ~~bevel~~ groove position from the image picked up by the CCD camera. The arithmetic processing apparatus compares the ~~bevel~~ groove position obtained by the image processing apparatus with a ~~bevel~~ groove position as designed, and calculates deviation therebetween. The servo motor moves the work head or the work table by a distance corresponding to an amount of the deviation of the ~~bevel~~ groove position calculated by the arithmetic processing means plus an amount of the offset of the work head and the CCD camera. The control means drives and controls the servo motor.

Page 9, please replace the paragraph beginning at line 24 through page 10, line 6, as follows:

With the above apparatus for manufacturing a control rod, the welding process can be automated. Further, since the ~~bevel~~ groove position is adjusted, the ~~bevel~~ groove line is reliably melted, the penetration bead on the rear surface of the sheath is secured and the welding process can be automated. In addition, the heat input is kept low and the deformation after the process is suppressed. Moreover, since the process speed of welding is increased, the productivity can be improved.

Page 10, please replace the paragraph at lines 7-18 as follows:

(7) In a method for manufacturing a control rod for a nuclear reactor, weep holes and piece-inserting holes are formed in the sheath by cut working and the periphery is cut. Thereafter, the neutron absorbers and the insertion pieces are inserted in a recess portion formed by bending the sheath. The piece-inserting holes and the insertion pieces are welded together by TIG welding, thereby forming an integral blade. The blades and handles are welded by TIG welding, and subsequently the blades and ~~lower blades~~ lower-blades are welded by TIG welding. Then, the welded portions are surface-finished by a wire brush or the like.

Page 10, please replace paragraph beginning at line 24, through page 11, line 3, as follows:

(8) In the welding time, to reliably melt a ~~bevel~~ groove line and secure the penetration bead on the rear surface of the sheath, automatic TIG welding is carried out at a position located immediately above a ~~bevel~~ groove or a position deviated in parallel from the ~~bevel~~ groove within a range of 3 mm.

Page 11, please replace the paragraph at lines 3-5 as follows:

With the above method, in any case, the ~~bevel~~ groove line is reliably melted and the penetration bead on the rear surface of the sheath is secured.

Page 11, please replace the paragraph at lines 6-25 as follows:

(9) A CCD camera is mounted on the work head, and the CCD camera in its entirety is moved to the ~~bevel~~ groove position as designed. An image near the welding portion is picked up by the CCD camera. The image processing apparatus detects the actual ~~bevel~~ groove position from the image, i.e., the coordinates of the center of the insertion piece from the ~~bevel~~ groove position in the case of welding the piece-inserting hole of the sheath and the insertion piece. In the case of welding the blades and the tie rod, welding of the blades and the handles or welding of the blades and the lower blades, the work start and end points of the welding are detected from the ~~bevel~~ groove position. The arithmetic processing apparatus compares the actual ~~bevel~~ groove position with the ~~bevel~~ groove position as designed, and calculates the deviation of the welding torch. After the welding torch is moved by a distance corresponding to the amount of the deviation of the welding torch plus the amount of the offset of the welding torch and the CCD camera, TIG welding is carried out.

Page 11, please replace the paragraph beginning at line 26 through page 12, line 4, as follows:

With the above apparatus for manufacturing a control rod, even if there is a difference between the ~~bevel~~ groove position as designed and the actual ~~bevel~~ groove position, the ~~bevel~~ groove line is melted reliably, the penetration bead on the rear surface of the sheath is secured, and the welding process can be automated.

Page 11, please replace the paragraph at lines 6-25 as follows:

(9) A CCD camera is mounted on the work head, and the CCD camera in its entirety is moved to the bevel position as designed. An image near the welding portion is picked up

by the CCD camera. The image processing apparatus detects the actual bevel position from the image, i.e., the coordinates of the center of the insertion piece from the bevel position in the case of welding the piece-inserting hole of the sheath and the insertion piece. In the case of welding the blades and the tie rod, welding of the blades and the handles or welding of the blades and the ~~lower blades~~ lower-blades, the work start and end points of the welding are detected from the bevel position. The arithmetic processing apparatus compares the actual bevel position with the bevel position as designed, and calculates the deviation of the welding torch. After the welding torch is moved by a distance corresponding to the amount of the deviation of the welding torch plus the amount of the offset of the welding torch and the CCD camera, TIG welding is carried out.

Page 12, please replace the paragraph at lines 11-21 as follows:

(10) In an apparatus for manufacturing a control rod of a nuclear reactor, the control rod comprising blades including neutron absorbers, insertion pieces and a sheath, a tie rod for fixing the blade, a handle and a ~~lower blade~~ lower-blade fixed to the tie rod and the blade, the blade is sandwiched between chillers made of two metal plates having openings only at welding ~~bevel~~ groove portions so that a TIG welding torch can access thereto. With this structure, since heat generated by welding is absorbed, welding deformation can be considerably suppressed.

Page 12, please replace the paragraph beginning at line 22, through page 13, line 4, as follows:

(11) In an apparatus for manufacturing a control rod of a nuclear reactor, the control rod comprising a blade including neutron absorbers, insertion pieces and a sheath, a tie rod for fixing the blade, a handle and a ~~lower blade~~ lower-blade fixed to the tie rod and the blade, there is provided a work table. a TIG torch, a CCD camera, an image processing apparatus,

an arithmetic processing apparatus, a servo motor and control means. The above apparatus comprises at least two TIG torches and two work tables.

Page 13, please replace the paragraph at lines 5-20 as follows:

The work table is used to set objects to be welded constituting the control rod and carry out welding. The CCD camera, mounted on the TIG welding torch, picks up an image of a portion near a ~~bevel~~ groove of the objects to be welded. The image processing apparatus detects a ~~bevel~~ groove position from the image picked up by the CCD camera. The arithmetic processing apparatus compares the ~~bevel~~ groove position obtained by the image processing apparatus with a ~~bevel~~ groove position as designed, and calculates a deviation therebetween. The servo motor moves the work head or the work table by a distance corresponding to an amount of the deviation of the ~~bevel~~ groove position calculated by the arithmetic processing means plus an amount of the offset of the work head and the CCD camera. The control means drives and controls the servo motor.

Page 13, please replace the paragraph beginning at line 21, through page 14, line 2, as follows:

With the above apparatus for manufacturing a control rod, the welding process can be automated. Further, since the ~~bevel~~ groove position is adjusted, the ~~bevel~~ groove line is reliably melted, the penetration bead on the rear surface is secured and the welding process can be automated. In addition, the heat input is kept low and the deformation after the process is suppressed. Moreover, if the two TIG torches are used simultaneously, the productivity can be improved.

Please replace the paragraph beginning at page 19, line 20, with the following rewritten paragraph:

The laser beam with high-pressure nitrogen gas is used to cut the periphery of the sheath and the holes in order to keep the accuracy high. Holes may be made by punching or shearing instead of using a laser beam. After the cutting, it is preferable that scribing is performed by means of a laser beam to confirm the bent position.

Page 20, please replace the paragraph at lines 16-23 as follows:

FIGS. 6A to 6F schematically show laser irradiation positions. As indicated by the arrows in FIGS. 6A and 6B, the laser irradiation position is basically located immediately above a ~~bevel~~ groove of the sheath 7 with which the insertion piece 8 is fit. However, it may be deviated from the ~~bevel~~ groove within a range of 0.1 to 2.0 mm as indicated by the arrows in FIGS. 6C and 6D to secure a penetration bead.

Page 20, please replace the paragraph beginning at line 24, through page 21, line 4, as follows:

If the bead width is small, laser beams may be irradiated several times so as to lap over one another, immediately above the ~~bevel~~ groove or in a range within 2 mm from the ~~bevel~~ groove, as indicated by the arrows in FIGS. 6E and 6F. In this case, the laser beam is passed several times to lap over one another, shifted within a range of 0.1 to 2.0 mm from the first pass or the first pass target position.

Page 21, please replace the paragraph at lines 12-15 as follows:

Through the methods shown in FIGS. 6A to 6F and FIGS. 7A and 7B, a wide and stable bead is obtained, the ~~bevel~~ groove line is reliably melted, and the penetration bead on the rear surface is secured.

Page 23, please replace the paragraph at lines 8-17 as follows:

The jib in its entirety is formed of copper, as shown in FIGS. 10A and 10B. The jigs are arranged so as to sandwich the sheath 7 on the upper and lower surfaces thereof, and used as chillers 16 in the laser welding time. Inverted cone-shaped holes ~~16s~~ 16a are provided on both surfaces of the chillers 16 at positions corresponding to the positions of the insertion pieces 8, so that the work head 20 shown in FIG. 8 or 9 can access thereto when the insertion pieces 8 are welded.

Page 23, please replace the paragraph at lines 26-27 as follows:

Then, four blades 3 are set to the tie rod 9, and handles 4 and ~~lower blades~~ lower-blades 5 are also set.

Page 24, please replace the paragraph at lines 3-16 as follows:

As shown in FIGS. 11A to 11C, the blades 3, the handles 4 and the ~~lower blades~~ lower-blades 5 are set to the tie rod 9 with at least three fixing jigs 17. Thus, the control rod 2 is assembled (S37). In this case, the fixing jig 17 is divided into two equal parts of upper and lower portions, as shown in FIG. 12. The four blades 3 are set in the upper half portion 17a and the lower half portion 17b and the crisscross tie rod 9 is set at the center of the portions. The fixing jig 17 near the handles 4 has a toothed portion on its circumferential surface. The toothed portion meshes with a gear 18 which is connected to a motor 19. ~~Turning~~ A turning force is transmitted to the fixing jig 17 by the motor 19, so that the work position can be changed.

Page 24, please replace the paragraph at lines 17-22 as follows:

The tie rod 9 and the blades 3 are not entirely ~~beveled~~ grooved along their overall lengths. As shown in FIG. 11D, the length of the welding ~~bevel~~ groove is about 3 to 8 cm. In the portions which are not welded, the sheath 7 and the tie rod 9 are separated to allow water to flow, i.e., coolant.

Page 24, please replace the paragraph at lines 23-26 as follows:

Further, as shown in the cross-sectional view of FIG. 11B, the tie rod 9 has sockets 35 to make the positioning with the sheath 7 easy. The position indicated by the arrow in the drawing is ~~beveled~~ grooved.

Page 25, please replace the paragraph at lines 9-12 as follows:

With this method, since the blade 3 and the tie rod 9 are fixed securely, the ~~bevel~~ groove line is prevented from deviating and the laser beam can be irradiated to the ~~bevel~~ groove line easily and reliably.

Page 25, please replace the paragraph beginning at line 23 through page 26, line 1, as follows:

Next, the tie rod 9 is welded (S38). The welding conditions are the same as those shown in FIGS. 5A and 5B. The irradiation position of the laser beam is basically located immediately above the ~~bevel~~ groove. However, it may he deviated from the ~~bevel~~ groove within a range of 2.0 mm to secure a penetration bead.

Page 26, please replace the paragraph at lines 2-9 as follows:

If the bead width is small, laser beams may be irradiated several times so as to lap over one another, immediately above the ~~bevel~~ groove or in a range within 2 mm from the ~~bevel~~ groove. Further, to increase the bead width, the laser beam may be moved circularly. In either case, the method of welding is the same as the welding of the insertion piece 8 shown in FIGS. 6A, 7A and 7B. Therefore, the description thereof is omitted.

Page 26, please replace the paragraph at lines 15-19 as follows:

The handles 4 and the ~~lower blades~~ lower-blades 5 are also welded by means of the laser beam at the same time (S39). The welded surfaces are smoothed with the wire brush (S40). Thus, production of the control rod 2 is completed.

Page 26, please replace the paragraph beginning at line 20 through page 27, line 7, as follows:

As described above, according to the first embodiment of the present invention, in the method for manufacturing the control rod 2 of the nuclear reactor, the sheath 7 is bent, after the weep holes, the piece-inserting holes and the periphery of the sheath are cut. The neutron absorbers 6 and the insertion pieces 8 are inserted in the bent sheath 7. The piece-inserting holes and the insertion pieces 8 are welded together by the laser beam, thereby forming an integral blade 3. The blades 3 and the tie rod 9 are welded together by the laser beam. Thereafter, the blades 3 and the handles 4 are also welded by the laser beam. Further, after the blades 3 and the ~~lower blades~~ lower-blades 5 are welded by the laser beam, the welded portions are finished with a wire brush.

Page 28, please replace the paragraph at lines 13-22 as follows:

In this state, four blades 3 are set to the tie rod 9. Handles 4 and ~~lower blades~~ lower-blades 5 are also set. The set state is as shown in FIGS. 11A to 11C. The blades 3, the handles 4 and the ~~lower blades~~ lower-blades 5 are set to the tie rod 9 with at least three fixing jigs 17. Thus, the control rod 2 is assembled (S46). In this case, the fixing jig 17 is divided into two equal parts of upper and lower portions, as shown in FIG. 12. The respective parts are set between the upper half portion 17a and the lower half portion 17b.

Page 28, please replace the paragraph at lines 23-25 as follows:

The tie rod 9 has sockets 35 to make the positioning with the sheath 7 easy. The boundary between the tie rod 9 and the sheath 7 is ~~beveled~~ grooved.

Page 28, please replace the paragraph beginning at line 26 through page 29, line 4, as follows:

Next, the tie rod 9 is welded by a laser (S47). The welding conditions are the same as those shown in FIGS. 5A and 5B. The irradiation position of the laser beam is basically located immediately above the ~~bevel~~ groove. However, it may be deviated from the ~~bevel~~ groove within a range of 2.0 mm to secure a penetration bead.

Page 29, please replace the paragraph at lines 5-12 as follows:

If the bead width is small, laser beams may be irradiated several times so as to lap over one another, immediately above the ~~bevel~~ groove or in a range within 2 mm from the ~~bevel~~ groove. Further, to increase the bead width, the laser beam may be moved circularly.

In either case, the method of welding is the same as that described with reference to FIGS. 5A and 5B and 6A to 6F. Therefore, the description thereof is omitted.

Page 29, please replace the paragraph at lines 16-22 as follows:

The handles 4 and the ~~lower blades~~ lower-blades 5 are also welded by means of the laser beam at the same time (S48). Then, the welded surfaces are smoothed with a wire brush (S49). Thereafter, the insertion pieces 8 are welded by the laser beam (S50), and the welded surface is smoothed with the wire brush (S51). Thus, production of the control rod 2 is completed.

Page 30, please replace the paragraph beginning at line 22 through page 31, line 4, as follows:

In this state, four blades 3 are set to the tie rod 9. Handles 4 and ~~lower blades~~ lower-blades 5 are also set. The set state is as shown in FIGS. 11A to 11C. The blades 3, the handles 4 and the ~~lower blades~~ lower-blades 5 are set to the tie rod 9 with at least three fixing jigs 17. In this case, the fixing jig 17 is divided into two equal parts of upper and lower portions, as shown in FIG. 12. The respective parts are set between the upper half portion 17a and the lower half portion 17b. Thus, the control rod 2 is assembled (S64).

Page 31, please replace the paragraph at lines 5-7 as follows:

The tie rod 9 has sockets 35 to make the positioning with the sheath 7 easy. The boundary between the tie rod 9 and the sheath 7 is ~~beveled~~ grooved.

Page 31, please replace the paragraph at lines 8-13 as follows:

Next, the tie rod 9 is welded (S65). The welding conditions are the same as those shown in FIGS. 5A and 5B. The irradiation position of the laser beam is basically located immediately above the ~~bevel~~ groove. However, it may be deviated from the ~~bevel~~ groove within a range of 2.0 mm to secure a penetration bead.

Page 31, please replace the paragraph at lines 14-21 as follows:

If the bead width is small, laser beams may be irradiated several times so as to lap over one another, immediately above the ~~bevel~~ groove or in a range within 2 mm from the ~~bevel~~ groove. Further, to increase the bead width, the laser beam may be moved circularly. In either case, the method of welding is the same as that described with reference to FIGS. 6A to 6F and FIGS. 7A and 7B. Therefore, the description thereof is omitted.

Page 31, please replace the paragraph beginning at line 25, through page 32, line 2, as follows:

The handles 4 and the ~~lower blades~~ lower-blades 5 are also welded by means of the laser beam at the same time. Then the welded surfaces are smoothed with a wire brush (S66). Thus, production of the control rod 2 is completed.

Page 35, please replace the paragraph at lines 9-14 as follows:

In the first and second embodiments descried above, in the case of welding of a comparatively narrow bead width of 0.1 to 2.0 mm, when the laser irradiation position is greatly deviated from the ~~bevel~~ groove position, it becomes difficult to carry out welding by means of a laser beam.

Page 35, please replace the paragraph at lines 15-21 as follows:

According to the fourth embodiment, to solve this problem, the ~~bevel~~ groove position is detected by the CCD camera 21 and the image processing apparatus 22 mounted on the work head 20, thereby correcting the laser beam irradiating position. As a result, the welding of the insertion pieces 8 and the tie rod 9 can be automatically carried out with high accuracy.

Page 35, please replace the paragraph beginning at line 22, through page 36, line 7, as follows:

As described above, according to the fourth embodiment of the present invention, the CCD camera 21 is mounted on the work head 20 and the CCD camera 21 in its entirety is moved by numerical control (NC) to the ~~bevel~~ groove position as designed. An image near the welding portion is picked up by the CCD camera 21. The image information is supplied to the image processing apparatus 22. The image processing apparatus 22 detects the actual ~~bevel~~ groove position from the image, i.e., the coordinates of the center of the insertion piece 8 from the ~~bevel~~ groove position in the case of welding the piece-inserting hole 37 of the sheath 7 and the insertion piece 8.

Page 36, please replace the paragraph at lines 8-20 as follows:

In the case of welding the blades 3 and the tie rod 9, welding of the blades 3 and the handles 4 or welding of the blades 3 and the ~~lower blades~~ lower-blades 5, the work start and end points of the welding are detected from the ~~bevel~~ groove position. The arithmetic processing apparatus 23 compares the actual ~~bevel~~ groove position with the ~~bevel~~ groove position as designed. As a result, the positional deviation of the laser beam irradiation is calculated based on the above. After the work head 20 is moved by a distance corresponding to the amount of the positional deviation of the laser beam irradiation plus the offset of the work head 20 and the CCD camera 21, the laser beam is irradiated.

Page 36, please replace the paragraph beginning at line 21, through page 37, line 2, as follows:

Therefore, even if there is a difference between the ~~bevel~~ groove position as designed and the actual ~~bevel~~ groove position, the ~~bevel~~ groove line is melted reliably, the penetration bead on the rear surface is secured, and the welding process is performed automatically. As a result, since the heat input in the welding time is kept low, the deformation after the process is suppressed. Moreover, since the process speed of welding is increased, the productivity can be improved.

Page 38, please replace the paragraph at lines 13-18 as follows:

With the above apparatus, the welding process can be automatically performed. In addition, the ~~bevel~~ groove line can be melted reliably by adjusting the ~~bevel~~ groove position, and the penetration bead on the rear surface is secured. Further, the welding process can be automatically performed.

Page 40, please replace the paragraph at lines 2-8 as follows:

As in the case of the first embodiment shown in FIGS. 6A and 6B, the torch position of the TIG welding machine is basically located immediately above a ~~bevel~~ groove of the sheath 7 corresponding to the insertion piece 8. However, it may be deviated from the ~~bevel~~ groove within a range of 0.1 to 3.0 mm as shown in FIGS. 6C and 6D to secure a penetration bead.

Page 40, please replace the paragraph at lines 9-12 as follows:

Through the methods shown in FIGS. 6A to 6F, a stable bead is obtained, the ~~bevel~~ groove line is reliably melted and the penetration bead on the rear surface is secured.

Page 40, please replace the paragraph at lines 18-22 as follows:

The neutron absorbers 6 and the insertion pieces 8 are stored in the sheath 7 and integrated with a blade 3. Thereafter, four blades 3 are set to a tie rod 9 and handles 4 and ~~lower blades~~ lower-blades 5 are also set, thereby assembling the control rod 2 (S119).

Page 40, please replace the paragraph beginning at line 27, through page 41, line 5, as follows:

The tie rod 9 and the blades 3 are not entirely ~~beveled~~ grooved along their overall lengths. As shown in the enlarged views of in FIGS. 11D and 11E, the length of the welding ~~bevel~~ groove is about 3 to 8 cm. In the portions which are not welded, the sheath 7 and the tie rod 9 are separated to allow water as a coolant to flow.

Page 41, please replace the paragraph at lines 6-9 as follows:

Further, as shown in the cross-sectional view of FIG. 11C, the tie rod 9 has sockets 35 to make the positioning with the sheath 7 easy. The position indicated by the arrow in the drawing is ~~beveled~~ grooved.

Page 41, please replace the paragraph at lines 15-20 as follows:

The tie rod 9 is welded by means of the TIG welding machines (S120). The welding conditions are the same as those shown in FIG. 22. The position of a TIG welding torch 20 is basically located immediately above a ~~bevel~~ groove. However, it may be deviated from the ~~bevel~~ groove within a range of 3.0 mm to secure a penetration bead.

Page 41, please replace the paragraph beginning at line 26, through page 42, line 1, as follows:

Then, the handles 4 and the ~~lower blades~~ lower-blades 5 are also welded in the same manner (S121). The welded surfaces are smoothed with a wire brush (S122).

Page 42, please replace the paragraph at lines 12-17 as follows:

The blades 3 and the tie rod 9 are welded by the TIG welding machines, and subsequently, the blades 3 and the handles 4 are also welded by the TIG welding machines. Further, the blades 3 and the ~~lower blades~~ lower-blades 5 are welded by the laser beam. Thereafter, the welded portions are smoothed with a wire brush or the like.

Page 44, please replace the paragraph at lines 2-4 as follows:

In this state, four blades 3 are set to the tie rod 9, and handles and ~~lower blades~~ lower-blades 5 are also set, thereby assembling a control rod 2 (S137).

Page 44, please replace the paragraph at lines 5-9 as follows:

Since the state in which the four blades are set to the tie rod 9 and the handles 4 and the ~~lower blades~~ lower-blades 5 are set and fixed by fixing jigs 17 is the same as that shown in FIGS. 11A and 12, the description thereof is omitted.

Page 44, please replace the paragraph at lines 10-15 as follows:

Then, the tie rod 9 is welded.(S138). The welding conditions are the same as those shown in FIG. 22. The position of a TIG welding torch 20 is basically located immediately above a ~~bevel~~ groove. However, it may be deviated from the ~~bevel~~ groove within a range of 3.0 mm to secure a penetration bead.

Page 44, please replace the paragraph at lines 19-24 as follows:

The handles 4 and the ~~lower blades~~ lower-blades 5 are also welded simultaneously by the laser beam (S139). After the welding, the welded surfaces are smoothed with a wire brush (S140). Subsequently, the insertion pieces 8 are welded by the laser beam (S141), and then the surfaces thereof are smoothed (S142).

Page 47, please replace the paragraph at lines 16-19 as follows:

In the sixth and seventh embodiments descried above, when the welding torch position is greatly deviated from the ~~bevel~~ groove position, welding itself becomes difficult.

Page 47, please replace the paragraph at lines 20-26 as follows:

According to the eighth embodiment, to solve this problem, the ~~bevel~~ groove position is detected by the CCD camera 21 and the image processing apparatus 22 mounted on the welding torch 20, so that the position of the welding torch can be corrected. As a result, the welding of the insertion pieces 8 and the tie rod 9 can be automatically carried out with high accuracy.

Page 47, please replace the paragraph beginning at line 27, through page 48, line 5, as follows:

As described above, according to the eighth embodiment of the present invention, the CCD camera 21 is mounted on the welding torch 20 and the CCD camera 21 in its entirety is moved by numerical control (NC) to the ~~bevel~~ groove position as designed. An image near the welding portion is picked up by the CCD camera 21.

Page 48, please replace the paragraph at lines 6-21 as follows:

The image information is supplied to the image processing apparatus 22. The image processing apparatus 22 detects the actual ~~bevel~~ groove position, i.e., the coordinates of the center of the insertion piece 8 to be welded. In the case of welding the blades 3 and the tie rod 9, welding of the blades 3 and the handles 4 or welding of the blades 3 and the ~~lower blades~~ lower-blades 5, the work start and end points of the welding are detected from the ~~bevel~~ groove position. The arithmetic processing apparatus 23 compares the actual ~~bevel~~ groove position with the ~~bevel~~ groove position as designed. As a result, the positional deviation of the TIG welding torch is calculated. After the welding torch is moved by a distance corresponding to the amount of the positional deviation of the position of the welding torch plus the TIG welding is carried out.

Page 48, please replace the paragraph beginning at line 22, through page 49, line 4, as follows:

Therefore, even if there is a difference between the ~~bevel~~ groove position as designed and the actual ~~bevel~~ groove position, the ~~bevel~~ groove line is melted reliably, the penetration bead on the rear surface is secured, and the welding process is performed automatically. As a result, since the heat input in the welding time is kept low, the deformation after the process is suppressed. Moreover, since the two welding torches are simultaneously used, the productivity can be improved.

Page 49, please replace the paragraph at lines 22-27 as follows:

With the above apparatus, the welding process can be automatically performed. In addition, the ~~bevel~~ groove line can be melted reliably by adjusting the ~~bevel~~ groove position, and the penetration bead on the rear surface is secured. Further, the welding process can be automatically performed.